

## PATENT ABSTRACTS OF JAPAN

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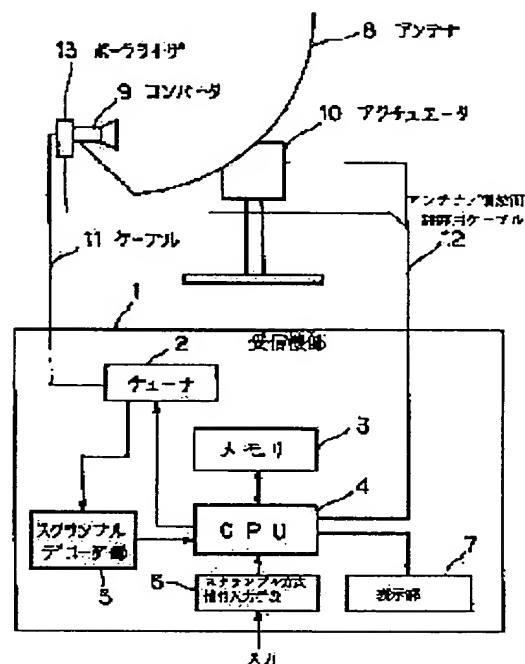
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## (54) SATELLITE RECEIVER

## (57)Abstract:

PROBLEM TO BE SOLVED: To automatically set the direction of an antenna to a target satellite by storing scramble information in a memory, comparing it with the descrambled information of a reception channel and discriminating a desired channel.

SOLUTION: A CPU 4 drives the antenna 8 in elevation and azimuth directions in the adjustment mode of an antenna direction, and when the AGC voltage of a tuner 2 becomes equal to or higher than a prescribed value, tentatively stores the control value of the direction setting in the memory 3. Then, the reception of a radio channel is tried, and at the time of normal reception conditions, descramble state information indicated by a scramble decoder part 5 and scramble system information stored in the memory 3 are compared, it is confirmed that the radio channel during reception is the desired channel and the control value of antenna direction adjustment is stored in the memory 3. Thus, antenna direction setting to the target satellite is automated.



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## CLAIMS

## [Claim(s)]

[Claim 1] The scramble method which at least one or more radio channels assigned to a geostationary satellite adopt in the satellite receiving set which receives the radio channel which a geostationary satellite emits, respectively, A storage means to store scramble method information including the information which shows the descrambling condition in each of said scramble method, While instructing actuation of the radio channel and antenna which should be received to be a scramble decoder means to descramble the received radio channel The information which shows said descrambling condition of the receiving radio channel obtained from said scramble decoder means, The satellite receiving set characterized by having the control means which carries out automatic setting of the direction of an antenna over at least one or more geostationary satellites which identify a receiving radio channel and are made into the object by comparing said scramble method information acquired from said storage means.

[Claim 2] The satellite receiving set according to claim 1 which has a scramble method information input means to store said scramble method information in said storage means.

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## DETAILED DESCRIPTION

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to direction adjustment of the antenna to two or more geostationary satellites, especially its automation.

[0002]

[Description of the Prior Art] When installing the antenna which makes applicable to receiving conventionally the radio channel emitted from two or more geostationary satellites Reception adjustment of the radio channel which turns an antenna in the near direction of the satellite which emits the radio channel which it is going to receive first, and is received is performed. The same activity was repeatedly done about each satellite which emits the radio channel made applicable to receiving by trial and error, having asked for the satellite which emits the radio channel for which it asks while using an exclusive measuring instrument, and carrying out memory of the control value of devices for antenna control, such as an actuator and a polarizer.

[0003]

[Problem(s) to be Solved by the Invention] The above activities were not easy for distinguishing the satellite which emits the radio channel for which it asks from the content of a program, a scramble method, etc. to especially employment of a satellite for the user who is not detailed, therefore direction setting out of the antenna for all request satellites had become a difficult activity.

[0004] Even if the object of this invention does not have information, such as an employment situation of a satellite, especially a scramble method of a radio channel, it is offering the satellite receiving set which can set automatically easily the direction of an antenna over all the satellites for which it asks as accuracy.

[0005]

[Means for Solving the Problem] The scramble method which at least one or more radio channels by which the satellite receiving set of this invention is assigned to a geostationary satellite adopt, respectively, A storage means to store scramble method information including the information which shows the descrambling condition in each of a scramble method, While instructing actuation of the radio channel and receiving antenna which should be received to be a scramble decoder means to descramble the scramble method of the received radio channel The information which shows the descrambling condition of the receiving radio channel obtained from a scramble decoder means, By comparing the scramble method information acquired from a storage means, a receiving radio channel is identified and it has the control means which controls the automatic setting of the direction of an antenna over at least one or more geostationary satellites made into the object.

[0006] You may have a scramble method information acquisition means to store the upper scramble method information in a store from the exterior furthermore.

[0007]

[Embodiment of the Invention] Next, with reference to [gestalt / of operation of this invention] a drawing, the example of the receiving set of satellite broadcasting service is explained. Drawing showing the example of the actuation locus of an antenna [in / in the flow chart and drawing 4 which show the automatic configuration procedure of the direction / in / in the flow chart and drawing 3 which show the procedure in which of the block diagram in which drawing 1 shows the example of a configuration of a satellite receiving set, and drawing 2 store the information about the scramble of each radio channel in a receiving set from the exterior / the satellite receiving set of drawing 1 / of an antenna / the satellite receiving set of drawing 1 R> 1], and drawing 5 are drawings showing the radio channel of each satellite, and an example of a scramble method.

[0008] The satellite receiving set shown in drawing 1 consists of a receiver section 1 and the antenna section, and Ryobe is connected by the cable 11. A receiver section 1 has a tuner 2, the rewritable memory 3, CPU4 that controls actuation of equipment at large, the scramble decoder section 5, the scramble method information input section 6, and a display 7, and the antenna section has the polarizer 13 which defines the actuator 10, the converter 9, and received plane

of polarization which drive an antenna 8 and an antenna 8. A receiver section 1 and the antenna section are connected by the cable 11 which connects an antenna section reception output to a tuner 2, and the antenna / cable for plane-of-polarization control 12 for controlling actuation of the antenna section from CPU4.

[0009] The received wave by the antenna with which bearing and plane of polarization were adjusted by the actuator 10 and polarizer 13 which had an object satellite and plane of polarization specified from CPU4 is sent to a tuner 2 from a converter 9. A tuner 2 corresponds to the frequency of the receiving channel specified from CPU4, and it tunes in and restores to it. Moreover, CPU4 controls actuation of an antenna 8 so that the AGC electrical potential difference of a tuner 2 becomes beyond the set point. The control data about antenna bearing setting out to the information and the radio channel about the descrambling condition in the scramble method and each scramble method which each radio channel and radio channels, such as it, adopt etc. is stored in memory 3. The scramble decoder section 5 descrambles the scramble method of the receiving channel sent from a tuner 2, and sends the descrambling status information to CPU4. CPU4 stores the antenna control data to a desired channel and the checked receiving radio channel in memory 3 by being in agreement as compared with the descrambling status information of each radio channel in which this descrambling status information is stored by memory 3.

[0010] When the information about the scramble method of each above-mentioned satellite is not stored in memory 3 before factory shipments, it can also input through the scramble method information input section 6.

[0011] The operating procedure in the case of storing the scramble method information on a radio channel in this case in memory 3 by the scramble method information input section 6 is explained. Actuation is performed by \*\*\*\*\* of the scramble information input section 6, looking at the lamp of a display.

[0012] In drawing 2, if it is first made setting-out mode by the button operation (step 101), it will change to satellite selection mode and a satellite will be chosen by the button operation (step 102). When a radio channel is chosen in order (A1 channel shown in drawing 5 when the introduction satellite A is chosen, and A2 channel) (step 103) and each channel is chosen, the scramble method the radio channel carries out [ a method ] the object for \*\* is chosen (step 104), and it is checked with the information which shows the descrambling condition in the method (step 105), and is stored in memory 3 one by one (step 106). After storing of the information about the upper scramble method is completed one by one about each radio channel of Satellite A, Satellite B is chosen and storing of sequential scramble method information is performed in order of a B one-channel B-2 channel. The scramble method information on the radio channel which had not been stored if needed as mentioned above is storable in memory with a user's hand.

[0013] Next, with reference to drawing 3, the procedure in which direction setting out of the antenna to the satellite which emits a desired radio channel is performed automatically is explained.

[0014] After carrying out the coarse control of the direction of an antenna and making a satellite receiver into a receive state first (step 401), when the regulating mode of the direction of an antenna is made to start, an antenna is made to drive in an elevation angle and the direction of an azimuth in drawing 3, as shown in drawing 4 (step 402). By such detailed adjustment, if the AGC electrical potential difference of a tuner 2 reaches the value beyond a predetermined value (step 403), antenna actuation is stopped and the control value of the direction setting out is stored temporarily in memory 3 (step 404).

[0015] Next, investigate whether about reception of the radio channel which asks for reception, an attempt and an AGC electrical potential difference show beyond a predetermined value, and are in a normal receiving situation (step 405), and if it is in a normal receiving situation If the descrambling status information which a scramble decoder shows is compared with scramble method information [ finishing / storing ] (step 406) and it checks that the radio channel under reception is a desired channel The control value of the direction adjustment of an antenna at that time is stored in memory 3, it moves to direction setting out by the same procedure to the

next satellite, the control value of the direction adjustment to all the satellites that emit the radio channel made applicable to receiving is stored in memory 3, and direction setting out of an antenna is ended. When the radio channel under reception is not able to receive normally at steps 405 or 406, or when it is able to receive normally and a scramble method is not in agreement with the scramble method of a desired radio channel, the same procedure will be again tried towards a different satellite.

[0016]

[Effect of the Invention] The satellite which emits a desired radio channel checks and the effectiveness that direction setting out of the antenna to the target satellite can carry out automatically is by judging whether the radio channel under reception is a desired radio channel by storing in memory scramble method information including the information which shows the scramble method which each radio channel which a satellite emits adopts, and its descrambling condition, and comparing with the information which shows the descrambling condition of the radio channel which received.

## DESCRIPTION OF DRAWINGS

## [Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the example of a configuration of the satellite receiving set of this invention.

[Drawing 2] It is the flow chart in the satellite receiving set shown in drawing 1 which showed the procedure which supplies the relation between a radio channel and a scramble method to memory.

[Drawing 3] It is the flow chart which shows the configuration procedure of the antenna bearing in the satellite receiving set shown in drawing 1.

[Drawing 4] It is drawing showing the example of the antenna actuation locus of the satellite receiving set shown in drawing 1.

[Drawing 5] The radio channel which a satellite emits, and its example of a response of a scramble method to adopt are shown.

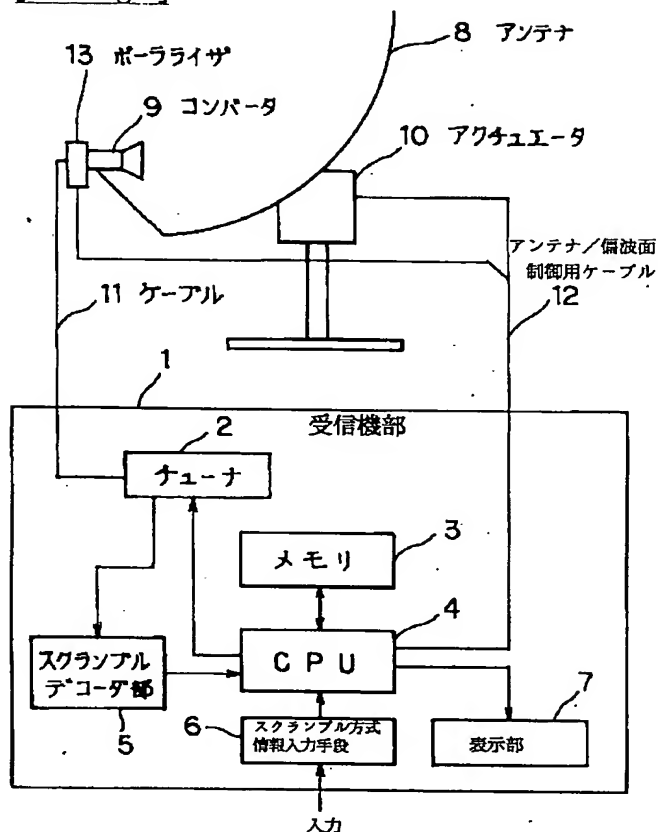
## [Description of Notations]

- 1 Satellite Receiver
- 2 Tuner
- 3 Memory
- 4 CPU
- 5 Scramble Decoder Section
- 6 Scramble Method Information Input Section
- 7 Display
- 8 Antenna
- 9 Converter
- 10 Actuator (Unit Section for Antenna Actuation)
- 11 Cable
- 12 Antenna / Cable for Plane-of-Polarization Control
- 13 Polarizer (Plane-of-Polarization Control Unit Section)

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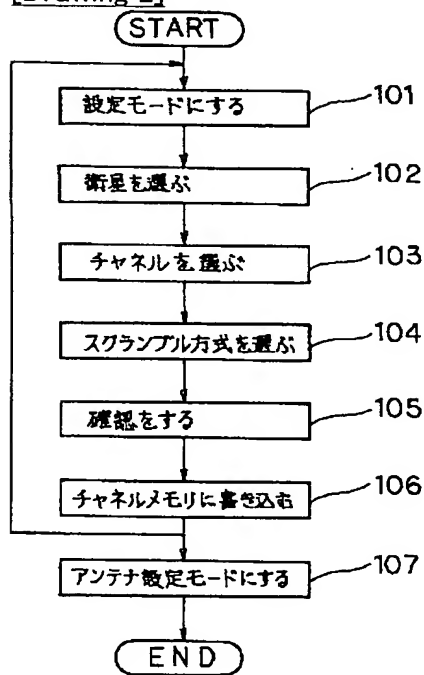
## DRAWINGS

[Drawing 1]

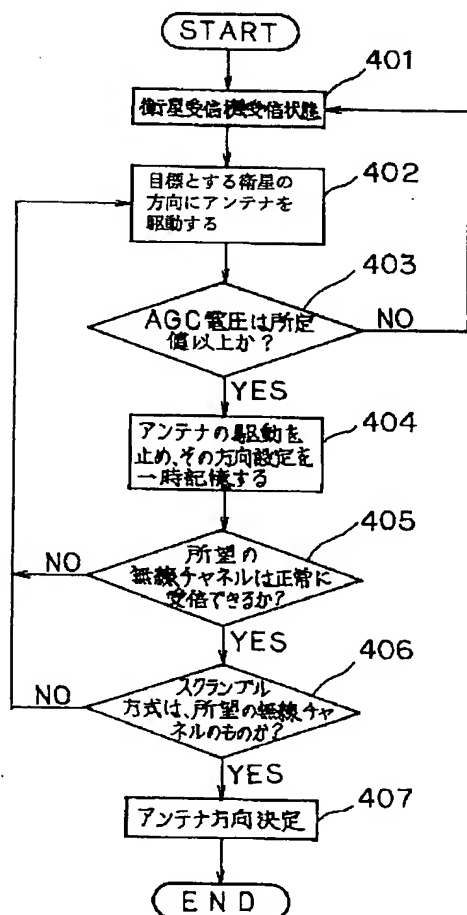


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[Drawing 2]

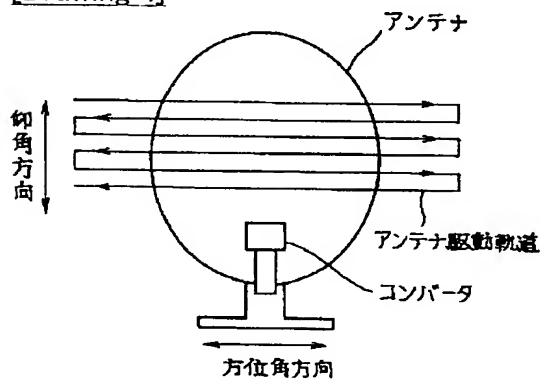


[Drawing 3]



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[Drawing 4]



[Drawing 5]

衛星A

無線チャネル	A1ch	A2ch	A3ch	A4ch	-----	ANch
スクランブル方式	a	a	b	a	-----	a

衛星B

無線チャネル	B1ch	B2ch	B3ch	B4ch	-----	BNch
スクランブル方式	a	b	b	b	-----	a